

What is claimed is:

1. In an NHRP/MPOA (Next Hop Resolution Protocol/Multi-Protocol Over ATM (Asynchronous Transfer Mod)) system, there is provided means for tracing route resolution by using Extensions of an NHRP protocol defined in RFC 2332.

2. The NHRP/MPOA system as claimed in claim 1, wherein there is further provided a MPOA client that traces route resolution by using an MPOA packet.

3. The NHRP/MPOA system as claimed in claim 2, wherein there is further provided an MPOA server that traces route resolution by using an MPOA packet.

4. The NHRP/MPOA system as claimed in claim 3, wherein there is further provided means for determining, by using the NHRP packet, whether or not a particular destination is reachable.

5. The NHRP/MPOA system as claimed in claim 4, wherein there is further provided means for detecting, in the same manner as a traceroute command particular to an IP (Internet Protocol) for detecting routers present on a data transfer route, a Next Hop server present on a data transfer route on the basis of the NHRP packet, and detecting said MPOA server that supervises MPOA data transfer.

6. The NHRP/MPOA system as claimed in claim 5, wherein the Extensions comprise three extensions, i.e., a Responder Address Extension, an NHRP Forward NHS Transit Record Extension and an NHRP Reverse Transit NHS Record Extension defined in RFC 2332, said means detecting said Next Hop server and said MPOA server by using said three

Extensions.

7. The NHRP/MPOA system as claimed in claim 5, wherein there is further provided means for detecting the Next Hop server or a last MPOA server by sending to a destination IP address an NHRP Resolution Request to which a Responder Address Extension, an NHRP Forward NHS Transit Record Extension and an NHRP Reverse NHS Transit Record Extension are added.

8. The NHRP/MPOA system as claimed in claim 7, wherein there are further provided:

an input unit serving as data inputting means;

an output unit comprising a display or a printer;

a route search commanding unit for analyzing a command received from said input unit or producing an address from a received packet;

a receipt unit for receiving a Resolution Request from the MPOA client;

a packet handling unit for analyzing a content of a received packet and executing necessary processing; and

a transmission unit for sending a Resolution Request to the MPOA client.

9. The NHRP/MPOA system as claimed in claim 8, wherein there is further provided a memory storing a routing table on the router, network interface information, and router information on which the MPOA server is mounted.

10. The NHRP/MPOA system as claimed in claim 9, wherein said

packet handling unit comprises:

a route resolving circuit for receiving a command from said route search commanding unit or delivering a result of address resolution to said route search commanding unit;

a route information storage for storing information relating to the Resolution Request, which said route resolving circuit has sent for displaying a route;

a layer 3 resolving circuit for determining, based on a layer 3 routing table of the router stored in said memory, a layer 3 address to which a received packet should be transferred;

a layer 2 resolving circuit for determining, based on information indicative of correspondence between layer 3 addresses and layer 2 addresses stored in said memory, a terminal to which the Resolution Request should be transferred or a layer 2 address of the router;

an MPC information processing circuit for writing in said memory information relating to at least one of an Ingress MPC from which an MPOA Resolution Request is received and an Egress MPC that has sent an MPOA Cache Imposition Request, and searching for said information stored;

a packetizing circuit for reconstructing, based on layer-by-layer address information determined by said MPC information processing circuit, said layer 3 resolving circuit and said layer 2 resolving circuit and the network interface information stored in said memory, a received packet to thereby produce a packet to be sent;

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and

an Extension reconstructing circuit for adding the Extensions or examining an Extension list to thereby add the layer 3 address of the router to said Extension list.

11. In an NHRP/MPOA system, there is provided means for tracing route resolution by using a Hop Count of an NHRP protocol defined in RFC 2332.

12. The NHRP/MPOA system as claimed in claim 11, wherein there is further provided a MPOA client that traces route resolution by using an MPOA packet.

13. The NHRP/MPOA system as claimed in claim 12, wherein there is further provided an MPOA server that traces route resolution by using an MPOA packet.

14. The NHRP/MPOA system as claimed in claim 13, wherein there is further provided means for determining, by using the NHRP packet, whether or not a particular destination is reachable.

15. The NHRP/MPOA system as claimed in claim 14, wherein there is further provided means for detecting, in the same manner as a traceroute command particular to an IP (Internet Protocol) for detecting routers present on a data transfer route, a Next Hop server present on a data transfer route on the basis of the NHRP packet, and detecting said MPOA server that supervises MPOA data transfer.

16. The NHRP/MPOA system as claimed in claim 15, wherein the Extensions comprise three extensions, i.e., a Responder Address Extension, an NHRP Forward NHS Transit Record Extension and an NHRP



MPOA server is mounted.

20. The NHRP/MPOA system as claimed in claim 19, wherein said packet handling unit comprises:

a route resolving circuit for receiving a command from said route search commanding unit or delivering a result of address resolution to said route search commanding unit;

a route information storage for storing information relating to the Resolution Request, which said route resolving circuit has sent for displaying a route;

a layer 3 resolving circuit for determining, based on a layer 3 routing table of the router stored in said memory, a layer 3 address to which a received packet should be transferred;

a layer 2 resolving circuit for determining, based on information indicative of correspondence between layer 3 addresses and layer 2 addresses stored in said memory, a terminal to which the Resolution Request should be transferred or a layer 2 address of the router;

an MPC information processing circuit for writing in said memory information relating to at least one of an Ingress MPC from which an MPOA Resolution Request is received and an Egress MPC that has sent an MPOA Cache Imposition Request, and searching for said information stored;

a packetizing circuit for reconstructing, based on layer-by-layer address information determined by said MPC information processing circuit, said layer 3 resolving circuit and said layer 2

resolving circuit and the network interface information stored in said memory, a received packet to thereby produce a packet to be sent; and

an Extension reconstructing circuit for adding the Extensions or examining an Extension list to thereby add the layer 3 address of the router to said Extension list.

21. In a route displaying method, Extensions of a NHRP protocol defined in RFC 2332 are used to trace route resolution.

22. The method as claimed in claim 21, wherein an NHRP packet is used to determine whether not a particular destination is reachable.

23. The method as claimed in claim 22, wherein a next Hop server present on a data transfer route is detected on the basis of the NHRP packet in the same manner as a traceroute command particular to an IP for detecting routers present on a data transfer route, and the MPOA server that supervises MPOA data transfer is detected.

24. The method as claimed in claim 23, wherein the Next Hop server and the MPOA server are detected by using a Responder Address Extension, an NHRP Forward NHS Transit Record Extension and an NHRP Reverse Transit NHS Record Extension defined in RFC 2332.

25. The method as claimed in claim 24, wherein at least one of the Next Hop server and a last MPOA server is detected by sending to the destination IP address an NHRP resolution request to which a Responder Address Extension, a NHRP Forward NHS Transit Record Extension and a NHRP Reverse NHS Transit Record Extension are added.

26. In a route displaying method, route resolution is traced by using a Hop Count of an NHRP protocol defined in RFC 2332.

27. The method as claimed in claim 26, wherein an NHRP packet is used to determine whether not a particular destination is reachable.

28. The method as claimed in claim 27, wherein a next Hop server present on a data transfer route is detected on the basis of the NHRP packet in the same manner as a traceroute command particular to an IP for detecting routers present on a data transfer route, and the MPOA server that supervises MPOA data transfer is detected.

29. The method as claimed in claim 28, wherein the Next Hop server and the MPOA server are detected by using a Responder Address Extension, an NHRP Forward NHS Transit Record Extension and an NHRP Reverse Transit NHS Record Extension defined in RFC 2332.

30. The method as claimed in claim 29, wherein at least one of the Next Hop server and a last MPOA server is detected by sending to the destination IP address an NHRP resolution request to which a Responder Address Extension, a NHRP Forward NHS Transit Record Extension and a NHRP Reverse NHS Transit Record Extension are added.